

We Claim:

1. A system for fault-tolerant processing, comprising:
a processor unit;
computer instructions executable by the processor unit and operable to:
 - detect at least one of: failure of other processor units in the system, and connectivity failures that disrupt communications between the processor units;
 - evaluate connectivity condition scores (CCSs) for the processor units, wherein the processor units are operable to communicate with each other via at least two communication paths, and the CCSs indicate connectivity errors experienced on each of the communication paths;
 - determine at least two candidate groups with the same number of at least a portion of the processor units to include in the system; and
 - select between the at least two candidate groups based on the CCSs.
2. The system of Claim 1, wherein the processor units in each candidate group are capable of communicating with the other processor units in the candidate group.
3. The system of Claim 1, wherein the severity of each connectivity error is factored into the corresponding CCS.
4. The system of Claim 1, wherein at least one of the CCSs is based on the history of connectivity errors on the corresponding communication path.
5. The system of Claim 1, further comprising:
computer instructions executable by the processor unit and operable to:
 - unpack a bit mask of normalized CCSs from each processor unit.

6. The system of Claim 1, further comprising:
computer instructions executable by the processor unit and operable to:
form a bi-directional CCS for each processor unit based on normalized
CCSs; and
select between the two candidate groups to include in the system based on
the bi-directional CCSs for the processor units in each candidate
group.
7. A system for fault-tolerant processing, comprising:
a processor unit configurable to communicate with other components in the
system via at least two switching fabrics; and computer instructions
executable by the processor unit and operable to:
maintain a connectivity condition score (CCS) for each communication
path along the at least two fabrics based on connectivity errors
experienced on the path, wherein the CCSs are utilized to
determine whether the processor unit will continue to be included
in the system.
8. The system of Claim 7, wherein the severity of each connectivity error is factored
into the corresponding CCS.
9. The system of Claim 7, wherein the number of connectivity errors during previous
observation time periods are factored into the corresponding CCS during an observation
time period.
10. The system of Claim 7, wherein the processor unit is further configured to
communicate the CCSs to at least one of the other components in the system.
11. The system of Claim 7, further comprising:
computer instructions executable by the processor unit and operable to:
summarize each set of CCSs into a single score.

12. The system of Claim 11, further comprising:
computer instructions executable by the processor unit and operable to:
normalize each set of CCSs based on the single score.
13. The system of Claim 7, further comprising:
computer instructions executable by the processor unit and operable to:
transform the normalized CCSs into a condensed format.
14. A computer product, comprising: /
data structures including:
a connectivity condition score (CCS) for each communication path
associated with a processor unit in a distributed processing system,
wherein the CCS indicates the connectivity condition of the
communication path during at least one observation period; and
a connectivity matrix indicating whether the processor unit is able to
communicate with other components in the system through any of
the communication paths.
15. The computer product of Claim 14, further comprising:
a single score representing the sum of the CCSs for the processor unit.
16. The computer product of Claim 14, wherein each CCS is normalized and stored in
a bit mask.
17. A method for regrouping processor units in a fault-tolerant system, comprising:
determining the ability of each processor unit to communicate with other /
processor units in the system;
forming at least two candidate groups with the same number of processor units
that are able to communicate with each other; and
evaluating connectivity condition scores (CCSs) for each candidate group of the
processor units, wherein each CCS indicates the connectivity condition of
one communication path associated with the corresponding processor unit.

18. The method of Claim 17, wherein the CCS is based on the number of connectivity errors experienced by the corresponding communication path.
19. The method of Claim 17, wherein at least one of the CCSs is based on the history of connectivity errors experienced by the corresponding communication path.
20. The method of Claim 18, wherein the severity of each connectivity error is factored into the corresponding CCS.
21. The method of Claim 18, further comprising:
 - forming a bi-directional CCS for each processor unit; and
 - selecting between the at least two candidate groups to include in the system based on the sum of the bi-directional CCSs for the processor units in each group.
22. The method of Claim 21, further comprising:
 - selecting an arbitrary one of the at least two candidate groups when the candidate groups have the same sum of bi-directional CCSs.
23. An apparatus for regrouping processor units in a fault-tolerant system, comprising:
 - means for forming at least two candidate groups of processor units that are able to communicate with each other; and
 - means for evaluating connectivity condition scores (CCSs) for each candidate group of the processor units, wherein each CCS indicates the severity of connectivity errors experienced by one communication path associated with the corresponding processor unit; and
 - means for selecting one of the at least two candidate groups based on the CCSs.
24. The apparatus of Claim 23, further comprising means for counting the number of connectivity errors experienced by the corresponding communication path during an observation period.

25. The apparatus of Claim 23, further comprising means for factoring into the CCS connectivity errors experienced by the corresponding communication path during at least one previous observation period.

26. The apparatus of Claim 23, further comprising means for selecting a candidate group based on the survival priority of the processor units included in each candidate group.

27. The apparatus of Claim 26, further comprising means for selecting a candidate group based on the CCSs, when both candidate groups have the highest number of processor units and/or processor units with the highest survival priority.